## REMARKS

Claims 1, 2, 4-9, and 11-17 will be pending upon entry of the present amendment. Claim 17 is newly presented. No new matter has been added to the specification by the present amendment.

Applicants thank the Examiner for indicating the allowability of claims 4-9.

New claim 17 recites, "equalizing pressures of the first and second cylinders to a pressure that is higher than a pressure of a low-pressure fluid supply of the hydraulic machine and lower than a pressure of a high-pressure fluid supply of the machine." Support for new claim 17 can be found in the specification, beginning at page 10, line 21. Claim 17 is believed to be allowable over the art of record.

### Summary of Rejections Under 35 U.S.C. § 103

Claims 1, 2, and 11-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Valentin (U.S. Patent 6,406,271) in view of Umeda et al. (U.S. Patent 6,186,748, hereafter *Umeda*).

In the discussion that follows, when a specific passage of a patent is cited, it will be indicated by a column number separated from a line number by a colon, e.g., 4:22, indicating column 4, line 22.

### Applicants' Response to Rejections of Claims

Claim 1 recites, in part, "a first pressure relief port located in the valve plate substantially outside of the annular region at a top-dead-center position; and a second pressure relief port located in the valve plate substantially outside of the annular region at a bottom-dead-center position, the second pressure relief port being in fluid communication with the first pressure relief port." A combination of Umeda with Valentin fails to teach or suggest these limitations of claim 1. In rejecting claim 1, the Examiner argues that "it would have been obvious to substitute the notched cylinder and offset bypass of Umeda for compensating ports of Valentin in order to achieve the predictable result of regulating and maintaining within acceptable bounds the pressure within the cylinders." Applicants strongly disagree, for a number of reasons, as explained below.

First, Valentin teaches away from a combination with Umeda. Valentin states that:

> [t]he development of noise in pumps or motors results from abrupt changes of forces due to abrupt pressure changes in the piston bore when rotating from one valve plate port to another. Prior art designs have basically attempted to delay the pressure change by providing grooves in [a] circumferential direction as extension of the ports. .... [T]he grooves increase the internal leakage and therefore reduce the efficiency.
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> ***
>
> It is therefore desirable to increase the efficiency ... and to reduce the noise ... of an axial-piston pump by overcoming these and other problems in the prior art.

*Valentin*, 4:19-41.

It can be seen that Valentin has, as an objective, the reduction or elimination of the internal leakage and attendant inefficiencies that arise from the prior art noise control designs.

Umeda represents an example of one of those inefficient prior art designs. Umeda notes that axial piston pumps typically generate noise, including high levels of harmonics, which "are particularly offensive to the ear" (*Umeda*, 1:13-22), and therefore provides, as an object of its invention, "decreasing harmonics of noises made by all piston chambers" (*id.*, 1:62-63). To do this, Umeda provides a valving element 1 with a sliding face F, including a discharge port T and a suction port S. Notches N1 and N2 extend circumferentially from respective ports T and S; conduits L1 and L2 are in fluid communication with respective ports S and T; and bypass ports M1 and M2 are in fluid communication with ports S and T, respectively (*id.*, 6:33-41, and see Figures 2B, 3A, and 3B). This arrangement, described in detail with reference to Figures 4A-4C at 6:66-8:19, permits a smoothing of the pressure fluctuations during operation, which, according to Umeda, significantly reduces the harmonic noise of the machine (*id.*, 8:323-36).

Referring to Umeda's Figure 4C, piston chamber opening C5 is shown 10° past top dead center (at the bottom of the image) and opening C9 is shown 10° before bottom dead center. Looking at the opening C5, it can be seen that it is in fluid contact with each of the notch N2, the conduit L2, and the bypass port M2, as well as a portion of the suction port S. As noted above, the notch N2 and conduit L2 are in fluid communication with the suction port S, while the bypass port M2 is in fluid communication with the discharge port T. While the opening C5 is in the position shown, it creates a fluid short circuit between the low-pressure suction port S and the high-pressure discharge port T, allowing high-pressure fluid to bleed from the discharge port T to the suction port

S, via the bypass port M2, the opening C5, the notch N2, and the conduit L2. It can also be seen that, as the cylinder block continues to rotate in a clockwise direction, the opening C9 will enter fluid contact with both of the bypass port M1 and the conduit L1, creating another fluid short circuit there, before the opening C5 breaks contact with the bypass port M2. Thus, it can be seen that there is virtually no point in the rotation of the cylinder block during which there is not some fluid leakage from the discharge port to the suction port via one or another of the piston chamber openings. This is precisely the kind of internal leakage and resultant loss of efficiency that Valentin teaches away from, as noted above. Accordingly, the proposed combination is improper for the purpose of rejecting claim 1. See MPEP § 2145, X, D, 2 ([i]t is improper to combine references where the references teach away from their combination).

Second, the proposed combination would render Valentin unsatisfactory for its intended purpose. As noted above, Valentin is directed to a system that eliminates the internal leakages associated with prior art noise reduction designs like that of Umeda. If, as argued by the Examiner, Umeda's bypass ports M1, M2 were substituted for Valentin's compensating ports75, 76, Valentin's bore channels 17 would create fluid short circuits between a bypass port and one of the main ports 73, 74 each time a bore channel reached the position of Umeda's opening C5 as shown in Figure 4C, or of the opening C1 as shown in Figure 4B. This would result in internal fluid leakage much as described above, and would therefore defeat Valentin's clear intent to prevent such leakage, thus rendering Valentin unsatisfactory for its intended purpose. See MPEP § 2143.01, V ([if a] proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification).

Furthermore, it cannot be argued that, in addition to substituting Umeda's bypass ports for Valentin's compensating ports, the bypass ports should be themselves modified to place them in fluid communication with each other, because such a modification is not within the established function of Umeda's bypass ports. As explained by the *KSR* court, "a court [or examiner] must ask whether the improvement is more than the predictable use of prior art elements *according to their established functions*." *KSR Intern. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, at 1740, 82 U.S.P.Q.2d 1385 (2007), with emphasis added. Because such a modification

would *change* the established function of the bypass ports, it cannot support a *prima facie* showing of obviousness.

Finally, even if Valentin did not teach away from the combination (which it does), and even if the proposed combination did not render Valentin unsatisfactory for its intended purpose (which it does), a combination of Valentin with Umeda would still fail to teach or suggest all the limitations of claim 1. Claim 1 recites that "... the first and second ports define inner and outer circumferences of an annular region of the valve plate," and recites "a first pressure relief port located in the valve plate substantially outside of the annular region at a top-dead-center position; and a second pressure relief port located in the valve plate substantially outside of the annular region at a bottom-dead-center position."

Referring to Umeda's Figure 4C, the opening C1 is shown substantially superimposed over the discharge port T. It can be seen that a radial dimension of an annular region defined by the discharge port is coextensive with the radial dimension of the openings C1-C9, with only their respective notches e extending outside the annular region. It can therefore be determined with some accuracy that the bypass port M2 is *not* located substantially outside the annular region, as defined by the inner border of opening C5, but is instead shown as being located substantially *within* the annular region, with only a small portion at one end extending outside the annular region. Likewise, with reference to Figure 4B, the bypass port M1 is not located substantially outside the annular region, as defined by the inner border of opening C1, but is positioned with more than half of its length lying inside the annular region. Furthermore, the bypass port M1 barely extends as far as bottom dead center, and would not be regarded by one of ordinary skill as being "at a bottom-dead-center position," but instead as being offset by a few degrees, while the bypass port M2 is even further separated from top dead center, with no portion approaching that point. Nor does either of Umeda or Valentin provide any teaching or suggestion to move Umeda's bypass ports to top- and bottom-dead-center. There is no benefit from such a move, nor would one of ordinary skill in the art, on the basis of common sense or any prior art teaching, be motivated to try such an arrangement. For all the reasons outlined above, claim 1 is allowable.

Claim 11 recites, in part, "means for equalizing fluid pressure in pairs of the plurality of cylinders on opposite sides of the circular arrangement, beginning only after the

cylinder ports of each pair of cylinders begin to cross top-dead-center and bottom-dead-center of rotation, respectively." A combination of Valentin with Umeda fails to teach or suggest all the limitations of claim 11. The Examiner acknowledges that Valentin does not teach means for equalizing beginning only after the cylinder ports begin to cross top and bottom-dead-center, but argues that Umeda provides such a teaching, and that a combination of Umeda with Valentin would be obvious. Applicants respectfully disagree. As demonstrated above, a combination of Umeda and Valentin is impermissible. But, even if such a combination were permissible, and if "opposite side" is read broadly to include, for example, Umeda's openings C1 and C5 (even though they are not directly opposite each other), Umeda cannot remedy Valentin's deficiency, because Umeda itself fails to teach or suggest "equalizing fluid pressure in pairs of the plurality of cylinders ... beginning only after the cylinder ports of each pair of cylinders begin to cross top-dead-center and bottom-dead-center of rotation, respectively."

Referring to Umeda's Figure 4A, and given a clockwise rotation of the cylinder block, it can be seen that opening C1 is at the point of coming into fluid contact with conduit L1, which is in fluid communication with the discharge port T. Meanwhile, opening C5 is still 20° short of breaking fluid contact with discharge port T, and almost that far short of beginning to cross top dead center. Thus, as the cylinder block rotates another degree, opening C1 will make fluid contact with the conduit L1, and cylinder B1 will begin rising in pressure, as shown by the solid line in Figure 5, while C5 remains well short of top dead center. Cylinder B5 (with opening C5), shown by the dashed line of Figure 5, remains at the pressure of discharge port T until, at a4, C1 and C5 are at an equal pressure, together with openings C2-C4, which are not shown in the drawings, but are understood to lie between C1 and C5. Thus, pressure equalizing of cylinders B1 and B5 *begins* when opening C1 first contacts conduit L1, at a2 (of Figure 5), while C5 is well short of top dead center. Additionally, B1 and B5 are not equalized as a pair, but instead, B1 is brought to equal the pressure of all of cylinders B2-B5. Clearly, Umeda cannot remedy Valentin's deficiency regarding equalizing pairs of cylinders beginning only after the cylinder ports begin to cross top- and bottom-dead-center. Accordingly, they cannot teach or suggest the limitations of claim 11, which is therefore allowable.

A combination of Valentin with Umeda fails to teach or suggest "placing a first cylinder, after its respective cylinder port begins to cross top-dead-center of rotation, in fluid

communication with a second cylinder, after its respective cylinder port begins to cross bottom-dead-center of rotation," as recited in claim 13. The combination is improper for reasons provided above, but even if this were not so, it would not teach the limitations of the claim. Valentin fails to teach or suggest placing first and second cylinders in fluid communication after the respective cylinder ports begin to cross top- and bottom-dead-center of rotation. Umeda cannot remedy the deficiency because it too fails to provide such a teaching. Referring to Umeda's Figure 4A, it can be seen that opening C1 is at the point of coming into fluid contact with conduit L1, which is in fluid communication with the discharge port T, while opening C5 is still 20° short of breaking fluid contact with discharge port T, and almost that far short of beginning to cross top dead center. As opening C1 makes fluid contact with the conduit L1, it is placed in fluid communication with opening C5 via the conduit L1 and the discharge port T before opening C5 begins to cross top dead center. Thus, neither Valentin nor Umeda provide this teaching, nor would it be obvious in view of either reference. Claim 13 is therefore allowable over these references.

Conclusion

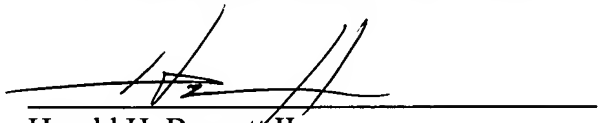
Overall, the cited references do not singly, or in any motivated combination, teach or suggest the claimed features of the embodiments recited in independent claims 1, 4, 11, or 13, and thus such claims are allowable. Applicants' decision not to argue the allowability of each of the dependent claims is not to be construed as an admission that such claims would not be allowable but for their dependence on allowable base claims, and Applicants reserve the right to present such arguments as may become necessary in the future. If the undersigned representative has overlooked a relevant teaching in any of the references, the Examiner is requested to point out specifically where such teaching may be found.

In light of the above amendments and remarks, Applicants respectfully submit that all pending claims are allowable, and therefore request that the Examiner reconsider this application and timely allow all pending claims. Examiner Hamo is encouraged to contact Mr. Bennett by telephone at (206) 694-4848 to discuss the above and any other distinctions between the claims and the applied references, and to address any informalities that may remain unresolved.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,

SEED Intellectual Property Law Group PLLC



Harold H. Bennett II
Registration No. 52,404

HHB:cm

701 Fifth Avenue, Suite 5400
Seattle, Washington 98104
Phone: (206) 622-4900
Fax: (206) 682-6031

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